Chemistry Quiz

Ch. 5 Electron Configuration and Quantum Theory

Name

Matching - write the corresponding element or symbol

Multiple Choice
11. The orbitals around an atom are regions of space defined mathematically by Erwin Schrödinger as locations where an electron
   a. has a 90% probability to be found   b. is always going to be found   c. has a 1000% probability to be found

12. The wavelength of a wave (multiple answers possible):
   a. is the distance from crest to crest of a wave   b. the number of photons in a wave   c. inversely proportion to its Energy   d. is the height of the wave

13. The Electromagnetic Spectrum is the range of electromagnetic radiation that changes due to different
   a. amplitudes   b. wavelength   c. colors   d. electrons

14. Comparing the wavelength, frequency, energy and speed of gamma rays to radio waves:
   a. gamma = longer wavelength, lower frequency, equal speed, higher E   b. gamma has higher in all four
   c. gamma = shorter wavelength, higher frequency, equal speed, higher E   d. radio has higher in all four

15. In reference to the colors of the visible spectrum, ROYGBIV, here they are in:
   a. increasing wavelength   b. decreasing frequency   c. increasing Energy

16. The Rutherford/Bohr model (previous chapter) of the atom was inadequate because it:
   a. didn’t explain where each electron was found   b. lacked accurate descriptions of the electron orbitals
   c. actually, it did not have any inadequacies   d. couldn’t explain the varied properties of the elements

17. Circle an example where two elements have vastly different properties, yet are only 1 electron different in their structures
   a. Sodium and Fluorine   b. Fluorine and Chlorine   c. Sodium and Neon   d. Neon and Argon

18. Quantum physics has established that Light travels as two different properties:
   a. called ambiguity, it is a wave and a line   b. called duality, it is a wave and a particle

19. A particle of electromagnetic energy (light) is called a:
   a. proton   b. electron   c. photon   d. quantum

20. A specific (just right) amount of energy that can be absorbed or emitted is called:
   a. quantum   b. photon   c. particle   d. positron

21. The amount of Energy that an atom absorbs is:
   a. is always its quantum   b. actually absorbed by the protons   c. the same as every other element

22. Electrons do not follow a consistent path. Instead they move randomly about in a region of space called:
   a. an orbit   b. an orbital   c. a quantum   d. a photon

23. There are how many naturally occurring Energy levels:
   a. 1   b. 3   c. 4   d. 7

24. In Orbital (Box) Diagrams, the maximum number of electrons (arrows) a single orbital (room) can have is:
   a. 2   b. 14   c. 10   d. 6

25. The ‘p’ sublevel contains a total of:
   a. 2 electrons   b. 6 electrons   c. 2 orbitals   d. 3 orbitals

26. The individual line spectra (atomic emission spectra) for each different element compared to another element is:
   a. the same due to the quanta that it emits   b. the same due to they all have identical configurations
   c. different due to they all emit different quanta   d. different because they want to be

27. An “old school” light bulb (with a metal filament) wastefully uses heat to generate light. This is called
   a. fluorescence   b. incandescence   c. phosphorescence   d. luminescence
28. Below are samples of orbital diagrams that may or may not violate the 3 rules. State how it breaks a rule, or if it’s correct as it is.

29. Describe, in detail, what occurred for the chemicals in the flame test lab to emit visible light. (Quantum Physics)

Give the electron configuration, noble gas shorthand, and orbital diagram for the following (3 things each):

<table>
<thead>
<tr>
<th>30. Fluorine</th>
<th>31. Potassium</th>
</tr>
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<tbody>
<tr>
<td>Config</td>
<td>Config</td>
</tr>
<tr>
<td>Nobel Gas</td>
<td>Nobel gas</td>
</tr>
<tr>
<td>Diagram</td>
<td>Diagram</td>
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<thead>
<tr>
<th>32*. Cobalt</th>
<th>33**. Au</th>
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<tbody>
<tr>
<td>Config</td>
<td>Config</td>
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35. The wavelength is represented by which letter?
36. The amplitude is represented by which letter?

37. How many full waves are shown in the diagram?
   a. 1  b. 2  c. 3.5  d. 7
38. What is the unit for frequency?
   a. waves/sec  b. m/s

Bonus: If a wave of electromagnetic light has a frequency of $1 \times 10^{15}$ Hz and a speed of $3.0 \times 10^8$ m/s, what is its wavelength?